

COORDINATED INTERDISCIPLINARY DIABETES CARE

**APPENDIX E**  
**Diabetes Care Coordination Team (DCCT) Roles and Responsibilities**

Team Member/Role	Responsibility
<b>MD – IFMC Hospitalist</b>	<ul style="list-style-type: none"> <li>✓ Consultant and final decision-maker with regard to BG, lipids, BP targets; medication prescription (standard of care medical management)</li> <li>✓ Hospital discharge appointment:               <ul style="list-style-type: none"> <li>▪ reinforcement of medication adherence</li> <li>▪ lifestyle modification</li> <li>▪ emphasis on patients’ self-care management</li> <li>▪ referral to ITS/PCP with appointment</li> </ul> </li> </ul>
<b>APN – CNS/NP</b>	<ul style="list-style-type: none"> <li>✓ Identification and navigation of high-risk diabetic patient from inpatient to outpatient setting</li> <li>✓ Promote literacy- and language-appropriate patient learning: diabetes self-management education and survival skills</li> <li>✓ Identify barriers to diabetes self-management</li> <li>✓ Refer to Diabetes Care Coordination Team</li> <li>✓ Attend hospital discharge appointment</li> <li>✓ Observe patient TeachBack of diabetes self-management education and survival skills</li> <li>✓ Ensure completion of Diabetes Care Coordination Note to include date/time of initial follow-up appointment, and MedRe</li> </ul>
<b>RD – Registered Dietician</b>	<ul style="list-style-type: none"> <li>✓ Consultant to high-risk patients and/or the requesting services with provision of               <ul style="list-style-type: none"> <li>▪ patient-centered nutrition (meal plan)</li> <li>▪ exercise goals</li> <li>▪ basic diabetes and CHO education</li> <li>▪ literacy appropriate and culturally sensitive education tools</li> </ul> </li> </ul>
<b>Pharm D – Clinical Pharmacist</b>	<ul style="list-style-type: none"> <li>✓ Consultant to high-risk patients and/or the requesting services with provision of               <ul style="list-style-type: none"> <li>▪ literacy-appropriate and culturally sensitive counseling and education tools regarding medication dosage and administration adherence, and potential adverse medication reactions – especially hypoglycemia</li> <li>▪ assistance with multiple comorbidities; potential issues with polypharmacy</li> </ul> </li> </ul>
<b>Case Manager – RN or MSW</b>	<ul style="list-style-type: none"> <li>✓ Provision of glucometer</li> <li>✓ Assistance with psychosocial barriers to diabetes self-management</li> </ul>

**APPENDIX F**

**Diabetes Care Coordination Note (DCCN) [EPIC EMR Research Progress Note]**

<b>Hospital Summary and Diabetes Care Transitions Recommendations</b>
Patient Name / Medical Record Number Date of Admission Date of Discharge
<u>Admitting diagnosis:</u> <u>Other diagnoses:</u> <u>Diabetes diagnosis and complications:</u>  Most recent A1C value: Most recent fasting blood glucose (FBG) value: Most recent point-of-care (POCT) blood glucose (BG) value: POCT BG range during hospitalization: Serum creatinine level: Urinalysis: Glucose Protein Ketones
Pre-hospital diabetes medication: Diabetes treatment during hospitalization: Discharge diabetes medication:
<u>Patient discharge disposition:</u> <u>LACE score:</u> <u>Barriers to self-care management and/or readmission risk factors:</u> Was the patient discharged on insulin? Was the patient discharged on oral or injectable hypoglycemics? Five or more medications? Depression or history of depression? Poor health literacy? Cultural and/or language barriers? Absence of insurance? Absence of social support? Hospitalized within the past six months? Diagnosis of cancer, CVA, COPD, DM, or HF? Patient with advanced or progressive serious disease?
<u>Medical follow-up appointments/referrals:</u>

Interdisciplinary team interventions:

Nursing

Nutrition

Pharmacy

Social Work/Case Management

Discharge appointment (Medication reconciliation and education; Appointments scheduled for hospital follow-up; Diagnosis education; Expectations for discharge) with TeachBack:

Diabetes Quality Measures:

- If T2DM, is patient at minimum on Metformin? On Insulin?
- Has assessment for diabetic nephropathy been made?
- Is patient on an ACE or ARB if indicated?
- Was lipid therapy initiated?
- Has systolic BP goal of <140/85 been met?
- Was smoking cessation addressed?
- Has aspirin been recommended with co-morbid CAD or high CV risk?
- Has A1C been evaluated within three months?
- Has a foot exam been completed?
- Has patient been referred to podiatry?
- Has patient been referred to ophthalmology?
- Was medical follow-up arranged?
- Has patient been referred to the Center for Wellness and Metabolic Health?
- Was medication reconciliation performed?

**APPENDIX G  
Diabetes Self-Management Education and Survival Skills Checklist**

<b>Learning Objective</b>	<b>Date</b>	<b>Individual(s) Trained*</b>	<b>Outcome Scale**</b>	<b>Tools***</b>	<b>Comments</b>
1					
2					
3					
4					
5					
6					
7					

**Learning objectives:**

- 1) What is Diabetes? A basic understanding of the key components of T2DM and its treatment.
- 2) Medication Reconciliation and Administration. How to take oral meds; how to inject insulin/other injectables: pen, syringe – single dose/mixed doses (DEMONSTRATION); understanding of medication name(s), dosage(s), side effects, and drug interactions; needle storage and disposal.
- 3) Nutrition Management. Basic understanding of healthful meal plan and exercise. Consistent CHO nutrition consults as needed.
- 4) Home Glucose Meter Use and Monitoring. Safe and effective use of meter (DEMONSTRATION): when to monitor blood glucose (BG); record keeping; BG targets
- 5) Hypoglycemia Signs and Symptoms. Causes, prevention, treatment – Rule of 15.
- 6) Hyperglycemia Signs and Symptoms. Causes, prevention, treatment.
- 7) Outpatient care and medical follow-up. Date and time of first follow-up appointment; barriers identified: need for financial assistance; need for medication and/or monitoring supplies; other needs.

**Key:**

<b>*Individual(s) trained</b>	<b>**Outcome scale of 0-5</b>	<b>***Tools used/provided</b>
PAT – patient SPS – spouse CGR – caregiver FAM – family members OTH – other	0 – Patient refused teaching 1 – No evidence of learning 3 – Partial learning 5 – Information learned	<ul style="list-style-type: none"> <li>▪ Diabetes 101 Booklet – Caring for your Diabetes: Basic Information to Help you Get Started.</li> <li>▪ Krames education sheets</li> <li>▪ Tigr video</li> <li>▪ Other</li> </ul>

## APPENDIX H

Coleman's 2002 Care Transitions Measure<sup>®</sup> (CTM<sup>®</sup>-3)

1. The hospital staff took my preferences and those of my family or caregiver into account in deciding *what* my health care needs would be when I left the hospital.

**Strongly Disagree**

**Disagree**

**Agree**

**Strongly Agree**

2. When I left the hospital, I had a good understanding of the things I was responsible for in managing my health.

**Strongly Disagree**

**Disagree**

**Agree**

**Strongly Agree**

3. When I left the hospital, I clearly understood the purpose of taking each of my medications.

**Strongly Disagree**

**Disagree**

**Agree**

**Strongly Agree**

**APPENDIX I****Care Transitions Provider Survey**

1. The patient has a good understanding of his diagnosis and the healthcare plan for managing it.

**Strongly Disagree**

**Disagree**

**Agree**

**Strongly Agree**

2. I received clear communication with regard to my patient's hospital course and plan of care prior to his/her initial ITS clinic visit.

**Strongly Disagree**

**Disagree**

**Agree**

**Strongly Agree**

3. The patient demonstrates understanding of his medication regimen and is following instructions appropriately and consistently.

**Strongly Disagree**

**Disagree**

**Agree**

**Strongly Agree**

## APPENDIX J

Table J1

*Baseline Characteristics of Study Participants*

Characteristic	Overall N=20	Intervention n=10	Control n=10	<i>p</i>
Gender – n (%)				
Male	13 (65)	7 (70)	6 (60)	1.00
Female	7 (35)	3 (30)	4 (40)	
Age – mean (SD)	50.6 (±10.8)	49.6 (±10.4)	50.6 (±11.0)	0.76
Race/Ethnicity – n (%)				
Hispanic	10 (50)	5 (50)	5 (50)	0.74
Caucasian	6 (30)	4 (40)	2 (20)	
African American	3 (15)	1 (10)	2 (20)	
Indian	1 (5)	0	1 (10)	
Family history – n (%)	13 (65)	6 (60)	7 (70)	1.00
Primary language – n (%)				
English	11 (55)	6 (60)	5 (50)	1.00
Spanish	9 (45)	4 (40)	5 (50)	
Education – n (%)				
Some ES	5 (25)	3 (30)	2 (20)	0.50
Some HS	11 (55)	6 (60)	5 (50)	
Some college	4 (20)	1 (10)	3 (30)	
Insurance – n (%)				
None	15 (75)	7 (70)	8 (80)	0.79
Medicaid	1 (.05)	0	1 (0.5)	
Medicare disability	3 (15)	3 (15)	0	
Medicare	1 (0.5)	0	1 (0.5)	
A1C – %	10.0 (±2.5)	10.9 (±2.6)	8.9 (±1.9)	0.12

Note: all percentages are based on total number of patients for each treatment group or overall as appropriate; *p* values are based on the Chi-Square test for categorical variable measures and on the 2-way *t* test for continuous variables.

Table J2

*In-Hospital Glycemic Control and Medical Nutrition Therapy*

Factor	Overall N=20	Intervention n=10	Control n=10
<b>Pre-hospital glycemic control</b>			
No pharmacotherapy – n (%)	4 (20)	3 (30)	1 (10)
Oral pharmacotherapy only – n (%)	6 (30)	2 (20)	4 (40)
Oral medication and Insulin – n (%)	2 (10)	2 (20)	0
Insulin only – n (%)	8 (50)	5 (50)	3 (30)
Basal (Lantus)	5 (25)	2 (20)	3 (30)
Basal (NPH)	5 (25)	3 (30)	2 (20)
Bolus with meals (Aspart)	1 (0.5)	1 (10)	0
Correctional (Aspart)	1	1	
Correctional (Regular)	2	1	1
<b>In-hospital glycemic control</b>			
No pharmacotherapy – n (%)	0	0	0
Oral pharmacotherapy only – n (%)	0	0	0
Oral medication and Insulin – n (%)	0	0	0
Insulin only – n (%)	20 (100)	10 (100)	10 (100)
Basal (Lantus)	11 (55)	5 (50)	6 (60)
Basal (NPH)	4 (20)	2 (20)	2 (20)
Bolus with meals (Aspart)	3 (15)	3 (30)	0
Correctional (Aspart)	18 (90)	10 (100)	8 (80)
Correctional (Regular)	1 (.05)	0	1 (10)
BBC	3 (15)	3 (30)	0
SS only (no basal)	5 (25)	3 (30)	2 (20)
<b>Discharge glycemic control</b>			
(*pre-hospital regimen; +escalation; -decrease in pharmacotherapy)			
No pharmacotherapy – n (%)	3 (15)	2*(20)	1*(10)
Oral pharmacotherapy only – n (%)	3 (15)	1* (10)	2* (20)
Oral medication and Insulin – n (%)	3 (15)	1+ (10)	1*(10)1-(10)
Insulin only – n (%)	10 (50)	6 (60)	4 (40)
Basal (Lantus)	4 (20)	2-(20)2+(20)	1*(10)
Basal (NPH)	4 (20)	1*(10)	1*(10)2+(20)
Bolus with meals (Aspart)	1 (0.5)	0	1+(10)
(prescribed, but not administered in hospital)			
Correctional (Aspart)	3 (15)	1-(10)2+(20)	0
Correctional (Regular)			
BBC	0	0	0
SS only (no basal)	1 (0.5)	1- (10)	0



Factor	Overall N=20	Intervention n=10	Control n=10
Patients with POCT BG values out of target range (<80 - >130 pre-prandial; >180 2 hours post-prandial) n (%)	20 (100)	10 (100)	10 (100)
Patients with POCT BG value <70 mg/dL – n (%)	3 (15)	2 (20)	1 (10)
Patients with POCT BG value <180 mg/dL at discharge – n (%)	6 (30)	5 (50)	1 (10)
Patients with POCT BG value >200 mg/dL at discharge – n (%)	13 (65)	4 (40)	9 (90)
MNT CHO diet – n (%)	17 (85)	10 (100)	7 (70)
Nutrition consultation – n (%)	15 (75)	9 (90)	5 (50)

APPENDIX K

	Attended Initial Follow-up Appointment		30-Day Hospital Readmission	
	Intervention	Control	Intervention	Control
Yes	9	7	No	9
No	1*	3	Yes	1

Figure K1. Primary outcomes: 1) the number of patients that did or did not attend an initial follow-up healthcare appointment after hospital discharge; and, 2) the number of patients that did or did not experience a hospital readmission within 30 days of discharge.

Note: \* Last point of contact for patient at 30 days was a Skilled Nursing Facility.

## APPENDIX L

### Author Guidelines

#### *AADE in Practice*

##### **Editor**

[Teresa L. Pearson, MS, RN, CDE, FAADE](#)

Innovative Health Care Designs

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**Article Categories** We look for the voice of experience and for articles that will help our readers in their everyday practice. We invite you to submit articles in any of the following categories.

**Departments** Articles must relate directly to the theme of the department it's submitted for and offer readers concrete, practical advice and direction for incorporating best practices and principles of diabetes education into their day-to-day activities. Department articles average 1000 - 1500 words. Departments include:

- Capsules: This department provides insights on issues related to the clinical management of diabetes and pre-diabetes including updates on new and current therapies and

pharmaceuticals, blood glucose monitoring and delivery devices and their implementation in providing best-practice care, as well as strategies for improving patient adherence.

- **Food for Thought:** This department provides updates on nutrition and lifestyle issues related to diabetes and pre-diabetes, including meal planning, weight management and physical activity, plus strategies for optimizing nutritional education.
- **Mind Sights:** This department explores the psychosocial aspects of diabetes education including counseling, mind/body connections and strategies for facilitating behavior change.

**Features** These articles are in-depth explorations of a variety of topics of interest to the diabetes educator. Case studies are welcome. The focus is on practical strategies for applying best practices, along with implementation examples or illustrations and the results. Tell us about your own experiences, challenges and successes. Feature submissions should average 1500 – 2000 words. The following are examples of topic categories for Feature articles:

- **Innovative diabetes programs:** Many of you are trying new and different strategies to deliver diabetes education and to increase access to your programs. Tell us about something unique about your program that has really worked for you.
- **Continuous quality improvement:** We all know CQI is a necessary component of patient care and program management. Tell us how you have used CQI to examine your practice's effectiveness, efficiency and quality of care. Provide examples or case studies describing how you implemented your quality improvement process.
- **Business aspects of diabetes education:** Tell us about your experiences with the business realities of our profession. Perhaps you have had particular success with reimbursement, marketing your practice or proving the worth of your program and the services of a diabetes educator. Tell us your story.
- **New roles for diabetes educators:** We are in the midst of an ever-changing health care system as well as an increasingly virtual world. How have you adapted your role as a diabetes educator? Are you an entrepreneur? Are you part of a health care home? Have you added "lifestyle coach" to your role as a diabetes educator?
- **Translating research into practice:** New research offers continuing opportunities to improve the practice of diabetes education and defend or prove its outcomes. Tell us about research you have conducted, including your experience and the outcomes, or about how you applied others' research to your own practice and the results.
- **AADE7™ Self-Care Behaviors:** The AADE7™ Self-Care Behaviors are fundamental to our work as diabetes educators. Focusing on one behavior — healthy eating, being active, monitoring, taking medication, problem solving, reducing risks or healthy coping — explain practical strategies you use to incorporate it into your work with patients. Tell us about your successes and challenges and your patients' successes and challenges, along with how you use both to continue to improve your approach and outcomes.
- **Tools for improving practice:** Diabetes educators are a creative and resourceful bunch. Many of us create or adapt innovative educational tools for patient and professional education. Share a tool you created, including what led you to create it, how you use it and your experiences with it. Or tell us about a tool that you adapted for use in your practice — perhaps even from another discipline.

**Reflections** Reflections offers readers a creative outlet for expressing themselves related to any

aspect of diabetes. This is a celebration of our wholeness — that we are not defined by our job and that we each have full lives. Bringing our whole selves to the table makes us better at our profession and can help prevent burnout. We encourage readers to submit stories, memoirs, poems, photographs, artwork, drawings, aphorisms and any other personal expression of their life or career experience. Submissions should be a maximum 600 words.

**Practice Pearls** Practice Pearls are short, timely, relevant tips, advice ideas or motivational messages for practicing diabetes educators. This might include a quick introduction to an educational tool, a brief how-to related to communicating a concept or demonstrating a self-care skill or anything else that is immediately accessible and quickly applicable in practice. Submissions should average 200-300 words.

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- Title page containing the article title, author names with credentials and institutional affiliations including city and state
- Complete mailing address, email and daytime telephone for lead author
- Keywords
- Body of Article
- Reference list
- List of figures with captions
- Acknowledgment of financial or other support

**References** A reference list limited to 3-5 references must be submitted with each Department or Feature article. Authors are responsible for the accuracy and completeness of references listed. Include references for data, statistics and information that are not common knowledge. References should be no more than 4 years old. It is not necessary to use in-text annotations to cite references. Rather, include in-text narrative citations for specific articles, studies or statistics. For example:

- According to an article by researchers at Harvard Medical School...
- The study, led by researchers from the Centers for Disease Control and Prevention...
- In her 2006 US Endocrine Disease report, "Investigating Inhaled Insulin," Virginia Zamudio asserts...

Material that has been accepted for publication but not yet published may be cited in the reference list with the journal name followed by "In press." Unpublished material may not be cited. Electronic forms of documents may be included in the reference list and should be cited according to the style for each type of electronic source. Please refer to the "Uniform Requirements for Manuscripts Submitted to Biomedical Journals" or the American Medical Association Manual of Style for proper reference format.

**Figures** Figures include charts, graphs, maps, photographs, illustrations and line art. Number figures consecutively in the order they appear in the article (e.g., Figure 1, Figure 2, etc.). Indicate placement of figures in the manuscript with the appropriate designation in parentheses (e.g., Figure 1) following the relevant content. Include a list of figures with a brief caption for each at the end of the document. Acceptable figures must be received before manuscripts can

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### **Notes on Writing Style**

- Write as if you're talking to the reader. Keep it informal and easy to read and relate to.
- Avoid the passive voice. Use active verbs indicating who is doing what. For example, say "inspect the foot" instead of saying "the foot is inspected."
- Avoid heavy academic or unnecessarily dense clinical language.
- Be specific and give examples for each important point you make. Instead of saying "look for signs of pressure," specify what signs to look for.
- Keep your topic focused. It's better to explore a narrow topic in-depth than to cover a broad topic at a high level. For example, focus on a specific aspect of gestational diabetes rather than writing in general about diabetes in pregnancy.
- Write from your experience. Readers need to know you've "been there," so give practical advice based on your own experience. If possible, use case studies based on real patients you've cared for. Change the names and identifiable details to protect patient anonymity.
- Use nonsexist language.
- Spell out abbreviations and acronyms at first mention followed by the abbreviation in parentheses. Limit the overall use of abbreviations.
- Use generic, nonproprietary names for medications and devices. At first mention, state the generic name followed in parentheses by the trade name with the appropriate symbol (® or ™) and the manufacturer's name, city and state.

### **Notes on Terminology**

- Avoid use of the term "diabetic." Use "individual with diabetes," "patient with diabetes" or "complications of diabetes."
- Use "type 1 diabetes" and "type 2 diabetes," Do not use IDDM or NIDDM.
- Use "blood glucose monitoring," not "blood sugar monitoring."
- Use "blood glucose check," not "blood glucose test."
- Use "blood glucose," not "blood sugar."
- Use "A1C," not "A1c."
- Unless describing research subjects, avoid the term "non-compliant."

**APPENDIX M****Draft Manuscript****Development and Implementation of an interdisciplinary Diabetes Care Coordination Pathway Focusing on the Transitional Care of High-Risk Adult Patients with T2DM and/or Hyperglycemia – A Feasibility Study****Authors**

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**Abstract**

Diabetes mellitus is a major and escalating chronic illness that affects more than nine percent of the United States' population and is the seventh leading cause of U.S. deaths. Many hospitalized patients present without a prior diagnosis of hyperglycemia, but are recognized as pre-diabetic, while others experience transient stress hyperglycemia during hospitalization. Still others present with evidence of poor diabetes self-management, education and support, and hospitalization provides an opportunity to assess and improve their current health status and glycemic control regimens. A growing body of evidence demonstrates that comprehensive glycemic control and interventions to increase patients' knowledge and self-care management skills are essential components of treatment, as is continuing support. Passage of the Patient Protection and Affordable Care Act of 2010 has re-focused attention on quality, to include effective patient care transitions, improved self-care management, and avoidable hospital readmissions. The purpose of this study was to implement an interdisciplinary inpatient diabetes care process that optimizes coordinated care transitions and patients' self-care knowledge. In this article, development of a diabetes care coordination team and pathway are described, and overall feasibility of implementation is evaluated. Several institutional process deficiencies were identified; these, too, are described and evidence-based recommendations for practice improvements are made.

**Key Words**

*transitional care, diabetes mellitus, patient outcomes*

## **Body of Article**

### **Introduction**

Diabetes mellitus (DM) is a major and escalating chronic illness that affects more than 29 million individuals (9.3% of the United States population) and is the seventh-leading cause of U.S. deaths; a diagnosis of pre-diabetes characterizes 37% of our population. Furthermore, the incidence of DM, which is a major cause of heart disease and stroke, and the leading cause of kidney failure, non-traumatic lower limb amputation, and adult-onset blindness, is expected to triple by 2050 (Centers for Disease Control and Prevention [CDC], 2014).

Many hospitalized patients present without a prior diagnosis of hyperglycemia, but are recognized as pre-diabetic, while others experience transient stress hyperglycemia during hospitalization. Still others present with evidence of poor diabetes self-management, education and support, and hospitalization provides an opportunity to assess and improve their current health status and glycemic control regimens. Patients are asked to translate a great deal of information regarding their disease process and its management into knowledge and skills; new behaviors must be adopted. A growing body of evidence demonstrates that comprehensive glycemic control and interventions to increase patients' knowledge and self-care management skills are essential components of treatment, as is continuing support. Passage of the Patient Protection and Affordable Care Act of 2010 has re-focused attention on quality, to include effective patient care transitions, improved self-care management, and avoidable hospital readmissions.

Diabetes care is complex, progressive, and requires input from a variety of healthcare organizations and providers. Quality and patient safety often are compromised when patients transition between settings because systems fail to ensure that vital elements of care are communicated among the various practitioners and facilities that a chronically ill person with acute exacerbations of diabetes or its complications might encounter. Among the resultant hazards are conflicting recommendations regarding self-management, medication errors, omission of services, lack of timely follow-up, and failure of patients to receive appropriate education, training, and support.

Our institution initiated its vision of improved hospital discharges and care coordination with the implementation of a Transitional Care Management (TCM) program in 2011, using Coleman's (2014) Transitional Care Program<sup>®</sup> as one structural component. Most recently, program leaders recognized that the institution's processes of referral between inpatient and outpatient settings would likely benefit from a more interdisciplinary approach to patient screening, care, and engagement, and that its method of shared documentation among healthcare providers must be enhanced.

### **A Descriptive Feasibility Study**

A systematic review of the literature demonstrated unanswered questions regarding the transitional care of patients with Type 2 DM (T2DM), especially among those less than 65 years of age. The review also suggested that better models for care coordination and approaches to hospital discharge are needed, and that nurse-led care is a practical and cost-effective prototype. It was the purpose of our study to develop and evaluate the implementation of an inpatient-to-outpatient diabetes care process that optimizes coordinated care transitions and self-care knowledge of high-risk adult patients with T2DM and/or hyperglycemia.

The hallmark of the study's design was the implementation of a behavioral intervention, the Diabetes Care Coordination Pathway (DCCP). Members of an interdisciplinary inpatient



Diabetes Care Coordination Team (DCCT) applied this evidence-based and patient-centered process of care, education, and documentation to ten study participants; another ten patients received usual hospital care. Key team members included an Advanced Practice Registered Nurse (APRN), hospitalists, nutritionists, pharmacists, and social workers.

The study's challenge was to integrate all components and providers associated with the health system's 2015 vision of care, which includes seamless hospital-based care, community-based coordinated care, and destination clinical services. Among the facilities associated with this vision are an 850<sup>+</sup>-bed tertiary-care medical campus; several county-wide transitional services discharge clinics, which provide temporary medical homes for patients without health insurance and/or care providers; and, two established centers for wellness and metabolic health, which are staffed by an endocrinologist, nurse practitioners, and several certified diabetes educators.

### Research Design

Adult (age 18 and older) general medicine patients who were hospitalized at the study institution's main medical campus with a diagnosis of Type 2 Diabetes Mellitus (T2DM) [ICD-9, MD chart diagnosis, or administration of a diabetes medication] and/or hyperglycemia [two or more episodes of a random blood glucose (BG) level of >180mg/dL], and who were eligible for care with the institution's TCM program were screened and consented for study inclusion.

Over a three-month period, the DCCP was applied to a prospective and randomly assigned sample (n=10) of intervention patients, while a comparable control group (n=10) received usual hospital care. Both groups were followed for 30 days post-hospital discharge (see Table 1).

The specific aim of the DCCP was to utilize an inpatient diabetes care facilitator, an advanced practice registered nurse, to organize an interdisciplinary and patient-centered education and documentation process. There were two research questions:

1. Will high-risk adult patients hospitalized with T2DM and/or hyperglycemia whose management is guided by implementation of the DCCP demonstrate greater attendance at their initial healthcare appointments following hospital discharge than those patients receiving usual care?
2. Will high-risk adult patients hospitalized with T2DM and/or hyperglycemia whose management is guided by implementation of the DCCP demonstrate fewer hospital readmissions within 30 days of discharge?

### Intervention

This study's intervention was the application of an interdisciplinary Diabetes Care Coordination Pathway that utilized an inpatient diabetes care facilitator, an APRN, to organize an interdisciplinary and patient-centered education and documentation process. The APRN facilitated bedside diabetes education based upon current practice guidelines that were implemented on high-risk patients by nursing, nutrition, pharmacy, and social-work staff (see Table 2). The evaluations and recommendations of members of the Diabetes Care Coordination Team (see Table 3) were communicated to outpatient providers prior to patient discharges using an electronic Diabetes Care Coordination Note (DCCN). The APRN provided medication reconciliation and discharge instructions during a diabetes discharge appointment that incorporated the *TeachBack* method of communication. Patients' appointments were

summarized in the DCCN, which was used to document completion of all components of a safe and effectual transition, and incorporated a diabetes quality assurance checklist (see Table 4).

## Results

Although there were no significant differences in attendance at initial follow-up discharge appointments or in 30-day readmission rates between the intervention and control groups, observational and descriptive aspects of the study provided insight into the study institution's current processes with regard to standards of diabetes care; patient, family, and provider knowledge; and, patients care coordination and transitions. Several themes emerged:

- Although there was an expressed institutional commitment to an interdisciplinary team approach to diabetes care, we found inconsistent awareness of and/or resources for provider knowledge and the provision of patient self-management education.
- There were missed opportunities in the provision of recommended inpatient standards of medical care in diabetes.
- Additionally, there were opportunities for improvement in the use of technology.
- Finally, and unexpectedly, we found feelings of marginalization and disenfranchisement among our patient population.

## Recommendations for Practice

Based upon a systematic review of the literature and pilot implementation of the DCCP, members of our interdisciplinary team made the following quality improvement recommendations for our healthcare system prior to the continuation of our research protocol with a larger number of participants:

- Integrate an **advanced practice registered nurse/certified diabetes educator** at the institution's main medical campus. Although a certified adult gerontology acute care nurse practitioner, the study coordinator did not have prescriptive authority at the study institution; therefore, she did not have final decision-making authority and could not effect change with regard to patients' pharmacotherapy during hospitalization. American Association of Diabetes Educators practice guidelines (2011) stress that Level 5 practitioners such as APRNs, CDEs, and physicians incorporate necessary skills and strategies of diabetes self-management education and training (DSME/T) into more comprehensive clinical management of individuals with diabetes. The APRN/CDE would be an active consultant for all members of the interdisciplinary DCCT, assessing the needs of all patients with DM, providing initial DSME/T, and coordinating each component of the DCCP from admission through discharge.
- Implement a multidisciplinary **Diabetes Steering Committee**. This organizational prototype would include individuals from the study's Diabetes Care Coordination Team who are representative of the inpatient medical campus, and the organization's Transitional Care Management program and its Centers for Wellness and Metabolic Health. This group would meet regularly to review current standards, policies, and order sets related to the care of patients with DM, ensure consistent implementation of the organization's DCCP, discuss and propose remedies for challenges and issues related to the processes of care coordination and transitions, and evaluate intervention effectiveness.
- Institute the implementation of **pockets cards** for all medical and advanced practice nursing personnel who have patient decision-making and prescriptive authority. These

cards would reflect the ADA Standards of Medical Care in Diabetes (2015) to include current glycemic targets, pharmacotherapy, and a quality assurance checklist (prevention/management of hypertension; hyperlipidemia; smoking cessation; co-morbid cardiovascular and renal disease; and diabetic neuropathy, nephropathy, and retinopathy) for inclusion in every *After Visit Summary* discharge note.

- Resurrect the **Diabetes Unit Champion (DUC)** committee for final development and implementation. Bedside nurses, nutritionists, pharmacists, and others from across the medical campus would meet monthly with inpatient and outpatient CDEs to develop and disseminate DSME/T materials to individual care units. They also would serve as resources to bedside nursing staff, identify potential needs among patients with diabetes, and confirm that patients have received and mastered survival skills training prior to discharge.
- Print sufficient copies of *Diabetes 101: Caring for Your Diabetes – Basic Information to Help You Get Started* and stock each patient unit for provision to patients with newly diagnosed or uncontrolled diabetes mellitus. Spanish-language versions of this booklet also must be made available for provision to the institution's large Hispanic population.
- Upgrade the hospital's closed-circuit education collection with Spanish-language videos that demonstrate safe insulin usage and diabetes self-management. Posters advertising the video collection and instructions for use should be placed in all patient care units.
- Hardwire the healthcare system's electronic medical record to trigger standard-of-care order entry and documentation.
- Update all diabetes-related policies and resources (system- and community-wide) on the health system's intranet.

### Limitations

The advanced practice registered nurse who coordinated and implemented the diabetes care pathway, was not an employee of the study institution and could not serve as the final decision-maker with regard to BG levels, pharmacotherapy, and discharge disposition; and therefore, could not always impact the final outcomes for these measures.

Despite this limitation, observational and descriptive aspects of the design allowed the researcher to probe outcomes related to glycemic control and foundational components of care that were informative of patients' and providers' barriers to care and the challenges of translating innovative programs such as the study institution's Transitional Care Management program into everyday practice. In essence, a gap analysis comparing the healthcare organization's current activities against potential performance was performed.

### Conclusions

Practice-focused nurses understand the concept of translational research and how difficult it can be to implement evidence in real-world settings.

The Diabetes Care Coordination Pathway, which was developed and implemented for use in this feasibility study, was deemed to be an effective tool for organizing and directing a multidisciplinary intervention for self-care knowledge and transitions of high-risk adult patients with T2DM and/or hyperglycemia from an inpatient to an outpatient environment. The study's delineation of roles and responsibilities for each member of the Diabetes Care Coordination Team were consistent with evidence-based recommendations that can be found in the recent healthcare literature.

Deficiencies in the institution's current processes of care and transitions of patients with T2DM and/or hyperglycemia were revealed, and the researchers were able to offer recommendations for improvements.

### **Implications for Further Study**

Occasionally the best solution isn't to simply push forward, but to take a step back, to collect and evaluate meaningful data about current processes, and to listen to real-world feedback from patients as well as from providers. Valuable lessons were learned during the implementation phase of this endeavor, and recommendations for practice improvements were made. The original stakeholders now suggest the completion of Plan Do Study Act (PDSA) worksheets as developed by the Institute for Healthcare Improvement (2015) to test each recommendation as it is implemented, prior to re-implementation of the overall research protocol with a larger study population.

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Table 1

*Baseline Characteristics of Study Participants*

Characteristic	Overall N=20	Intervention n=10	Control n=10	<i>p</i>
Gender – n (%)				
Male	13 (65)	7 (70)	6 (60)	1.00
Female	7 (35)	3 (30)	4 (40)	
Age – mean (SD)	50.6 (±10.8)	49.6 (±10.4)	50.6 (±11.0)	0.76
Race/Ethnicity – n (%)				
Hispanic	10 (50)	5 (50)	5 (50)	0.74
Caucasian	6 (30)	4 (40)	2 (20)	
African American	3 (15)	1 (10)	2 (20)	
Indian	1 (5)	0	1 (10)	
Family history – n (%)	13 (65)	6 (60)	7 (70)	1.00
Primary language – n (%)				
English	11 (55)	6 (60)	5 (50)	1.00
Spanish	9 (45)	4 (40)	5 (50)	
Education – n (%)				
Some ES	5 (25)	3 (30)	2 (20)	0.50
Some HS	11 (55)	6 (60)	5 (50)	
Some college	4 (20)	1 (10)	3 (30)	
Insurance – n (%)				
None	15 (75)	7 (70)	8 (80)	0.79
Medicaid	1 (.05)	0	1 (0.5)	
Medicare disability	3 (15)	3 (15)	0	
Medicare	1 (0.5)	0	1 (0.5)	
A1C – %	10.0 (±2.5)	10.9 (±2.6)	8.9 (±1.9)	0.12

Note: all percentages are based on total number of patients for each treatment group or overall as appropriate; *p* values are based on the Chi-Square test for categorical variable measures and on the 2-way *t* test for continuous variables.

Table 2

*Diabetes Care Coordination Team Roles and Responsibilities*

Team Member/Role	Responsibility
<b>MD</b> – Medical Campus Hospitalist	<ul style="list-style-type: none"> <li>✓ Consultant and final decision-maker with regard to blood glucose, lipids, blood pressure targets; medication prescription (standard-of-care medical management)</li> <li>✓ Hospital discharge appointment:                             <ul style="list-style-type: none"> <li>▪ reinforcement of medication adherence and lifestyle modification</li> <li>▪ emphasis on patients’ self-care management</li> <li>▪ referral to TCM with complete <i>AfterVisitSummary</i> documentation</li> </ul> </li> </ul>
<b>APRN</b> – Clinical Nurse Specialist/Nurse Practitioner <b>CDE</b> – Certified Diabetes Educator	<ul style="list-style-type: none"> <li>✓ Identification and navigation of high-risk diabetic patient from inpatient to outpatient setting</li> <li>✓ Promotion of literacy- and language-appropriate patient learning: diabetes self-management education and survival skills</li> <li>✓ Identification of barriers to diabetes self-management</li> <li>✓ Referral to Diabetes Care Coordination Team</li> <li>✓ Attendance at hospital discharge appointment</li> <li>✓ Observation of patient <i>TeachBack</i> regarding self-management education and survival skills</li> <li>✓ Insurance of completion of Diabetes Care Coordination Note to include date/time of initial follow-up appointment, and MedRec.</li> </ul>
<b>RD</b> – Registered Dietician	<ul style="list-style-type: none"> <li>✓ Consultant to high-risk patients and/or those requesting services with provision of                             <ul style="list-style-type: none"> <li>▪ patient-centered nutrition (meal plan) and exercise goals</li> <li>▪ basic diabetes and carbohydrate education</li> <li>▪ literacy appropriate and culturally sensitive education tools</li> </ul> </li> </ul>
<b>Pharm D</b> – Clinical Pharmacist	<ul style="list-style-type: none"> <li>✓ Consultant to high-risk patients and/or those requesting services with provision of                             <ul style="list-style-type: none"> <li>▪ literacy-appropriate and culturally sensitive counseling and education tools regarding medication dosage and administration, adherence, and potential adverse medication reactions – especially hypoglycemia</li> <li>▪ assistance with multiple comorbidities and potential issues with polypharmacy</li> </ul> </li> </ul>
<b>Case Manager</b> – Social Worker	<ul style="list-style-type: none"> <li>✓ Provision of glucometer</li> <li>✓ Assistance with psychosocial barriers to diabetes self-management and appointment-keeping behavior</li> </ul>

Table 3

*Diabetes Self-Management Education and Survival Skills Checklist*

Learning Objective	Date	Individual(s) Trained*	Outcome Scale**	Tools***	Comments
1					
2					
3					
4					
5					
6					
7					

**Learning objectives:**

- 8) What is Diabetes? A basic understanding of the key components of T2DM and its treatment.
- 9) Medication Reconciliation and Administration. How to take oral meds; how to inject insulin/other injectables: pen, syringe – single dose/mixed doses (DEMONSTRATION); understanding of medication name(s), dosage(s), side effects, and drug interactions; needle storage and disposal.
- 10) Nutrition Management. Basic understanding of healthful meal plan and exercise. Consistent Carbohydrate nutrition consults as needed.
- 11) Home Glucose Meter Use and Monitoring. Safe and effective use of meter (DEMONSTRATION): when to monitor blood glucose (BG); record keeping; BG targets
- 12) Hypoglycemia Signs and Symptoms. Causes, prevention, treatment – Rule of 15.
- 13) Hyperglycemia Signs and Symptoms. Causes, prevention, treatment.
- 14) Outpatient care and medical follow-up. Date and time of first follow-up appointment; barriers identified: need for financial assistance; need for medication and/or monitoring supplies; other needs.

**Key:**

*Individual(s) trained	**Outcome scale of 0-5	***Tools used/provided
PAT – patient SPS – spouse CGR – caregiver FAM – family members OTH – other	0 – Patient refused teaching 1 – No evidence of learning 3 – Partial learning 5 – Information learned	<ul style="list-style-type: none"> <li>▪ Diabetes 101 Booklet – Caring for your Diabetes: Basic Information to Help you Get Started.</li> <li>▪ Krames education sheets</li> <li>▪ Tigr video</li> <li>▪ Other</li> </ul>

Table 4

*Diabetes Care Coordination Note*

<b>Hospital Summary and Diabetes Care Transitions Recommendations</b>
Patient Name / Medical Record Number Date of Admission Date of Discharge
<u>Admitting diagnosis:</u> <u>Other diagnoses:</u> <u>Diabetes diagnosis and complications:</u>  Most recent A1C value: Most recent fasting blood glucose (FBG) value: Most recent point-of-care (POCT) blood glucose (BG) value: POCT BG range during hospitalization: Serum creatinine level: Urinalysis: Glucose Protein Ketones
Pre-hospital diabetes medication: Diabetes treatment during hospitalization: Discharge diabetes medication:
<u>Patient discharge disposition:</u> <u>LACE score:</u> <u>Barriers to self-care management and/or readmission risk factors:</u> Was the patient discharged on insulin? Was the patient discharged on oral or injectable hypoglycemics? Five or more medications? Depression or history of depression? Poor health literacy? Cultural and/or language barriers? Absence of insurance? Absence of social support? Hospitalized within the past six months? Diagnosis of cancer, CVA, COPD, DM, or HF? Patient with advanced or progressive serious disease?
<u>Medical follow-up appointments/referrals:</u>   



Interdisciplinary team interventions:

Nursing

Nutrition

Pharmacy

Social Work/Case Management

Discharge appointment (Medication reconciliation and education; Appointments scheduled for hospital follow-up; Diagnosis education; Expectations for discharge) with TeachBack:

Diabetes Quality Measures:

- If T2DM, is patient at minimum on Metformin? On Insulin?
- Has assessment for diabetic nephropathy been made?
- Is patient on an ACE or ARB if indicated?
- Was lipid therapy initiated?
- Has systolic BP goal of <140/85 been met?
- Was smoking cessation addressed?
- Has aspirin been recommended with co-morbid CAD or high CV risk?
- Has A1C been evaluated within three months?
- Has a foot exam been completed?
- Has patient been referred to podiatry?
- Has patient been referred to ophthalmology?
- Was medical follow-up arranged?
- Has patient been referred to the Center for Wellness and Metabolic Health?
- Was medication reconciliation performed?